Diversity, Inclusion, Equity, and Belonging Statement

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Through my research, teaching, and service, I strive to make the field of robotics, and computing more broadly, more accessible. I acknowledge and support the fact that all students and colleagues enter new courses and jobs with different backgrounds, expectations, preparations, and life contexts. I strive to foster an inclusive environment in my lab and classrooms in which everyone feels like they can learn, grow, and achieve. In addition, I am working to lower the barriers to entry of robotics and computing through my research and global outreach activities.

Within the Walls of my Classroom

My hope is that my classroom is an inclusive and supportive learning environment, my office hours are a safe space where students can ask any question, and that all students feel that they belong and can succeed.

I include a statement on course syllabi that explicitly calls out the fact that the course staff may have blind spots and that science has historically been dominated by a small subset of privileged voices. I also ask for anonymous feedback early and often, reveal the results publicly, and course correct accordingly. I try to spread out teaching staff office hours across the week at varying times and always offer additional office hours by appointment so that all students have a chance to attend regardless of their commitments to jobs or other extracurricular activities. I ensure that students have the opportunity to see the same topic through different lenses of learning to enable all students to engage with the content in the way they learn best. Finally, I try to design courses around assignments and projects that align grades with students' understanding of key course concepts and not just their test taking and memorization abilities. For example, for an advanced undergraduate / graduate course on embedded machine learning (ML), often referred to as TinyML, I designed an assignment that asked students to construct their own Keyword Spotting model (think "OK Google"). This assignment was graded not on the final model accuracy, but on the students' explanation and design of their data collection and testing scheme.

Around Campus and Around the Globe

I want to enable the next generation of global innovators and leaders by improving access to high quality educational materials and programs on cutting edge topics. While at Barnard, and during my PhD, I spent a significant amount of time on these efforts, and hope to continue to develop high quality open-source educational content and foster its global adoption and adaptation for outreach programs at your college or university.

The vast majority of my outreach efforts to-date have centered around my position as co-founder and co-Chair of the Tiny Machine Learning Open Education Initiative (TinyMLedu). This began during my PhD, when I co-developed a four course series on TinyML on edX which has been taken by over 100,000 students from over 190 countries, achieving its design goal of widening global access to applied machine learning [1]. Based on requests from the community for further support to develop locally specific courses, seminars, and workshops on TinyML, and in collaboration with Harvard University, the Abdus Salam International Centre for Theoretical Physics in Italy, and the Universidade Federal de Itajubá in Brazil, I co-launched TinyMLedu and the TinyML4D global academic network. Since their inception, we have built a global community and taught embedded ML through a series of remote, hybrid, and in-person educational workshops, in-progress research show & tells, seminar series, and working group meetings. Overall more than 1,000 learners from over 75 countries have directly benefited from network activities, and our educational materials have been translated and taught in a number of different languages. We have even documented our results through collaborative academic publications, which I led [2, 3], and have supplied a 40 university network across the global south with the hardware resources needed to teach and research embedded ML.

During my time at Barnard I have also served as an Associate Co-Chair for the IEEE-RAS Technical Committee (TC) on Model-Based Optimization for Robotics (TCOptRob). As a TC, we have made great strides to improve the accessibility of our research area, as well as develop a globally community, winning the "Blue Ribbon TC Award" in 2023 (formerly the "Most Active TC Award"), and recently a RAS-TEP grant to host a summer school on Optimization for Robotics in Greece in July 2025. I have also organized a number of workshops at major robotics and architecture/systems conferences explicitly designed to help reduce the barriers between academic sub-fields including: RSS 2022, IROS 2023, MLSys 2023, MICRO 2022, 2023, 2024, and ICRA 2025 (under review).

Looking forward, I aim to continue to lead TinyMLedu and TCOptRob and grow their global impact, while developing additional globally-accessible, open-source courses on new and exciting computer science and engineering

topics. I am excited to have won funding to support such efforts in robotics through my recent NSF CSSI and RAS-TEP grants and have a pending EU Cost Action on TinyML as well. Finally, I recently helped form the TinyML Foundation Industry Academia Partnership Committee to further future collaborative education and global access initiatives between academia and industry, and have also been in talks with Adom Inc. to develop the first remote-hands-on electronics course for AI accelerators, leveraging their state-of-the-art electronics facility.

I have also been fortunate to be a one-on-one mentor for a vast number of students, and have explicitly designed my research lab's structure to open up as many research opportunities as possible. Overall, in less than three years, I have mentored over 31 students through Barnard, Columbia, and NSF funded summer undergraduate research programs, as well as an additional 58 undergraduates, and 16 masters students, through various independent studies and extracurricular research projects. The majority of these students have been undergraduate women – most in their first formal research experience – and a large proportion have also been from other underrepresented groups. Given our recent research on the underrepresentation of women in robotics, and the potential for undergraduate exposure to be a lever that can help begin to address this critical issue [4], I am proud of our lab's efforts. And, excitingly, a number of our lab alumni have gone onto graduate school, two have received NSF GRFP Fellowships / Honorable Mentions, many have gained employment at top companies like NVIDIA and Google, and one even took a year off of college to support the 2024 presidential election as a data scientist. At your college or university, I would look forward to continuing to support and mentor undergraduate and graduate students in both research and teaching, and by supporting existing programs on your campus.

Finally, given my experience at MIT in what amounted to an effective post-baccalaureate year, I was able to serve on the post-baccalaureate working group for the Harvard SEAS Committee on Diversity, Inclusion, and Belonging, which lead to a permanent a DIB post-baccalaureate "bridge-to-PhD" program. I would be excited to help support similar programs on your campus.

Through my Research

Currently, cutting edge research on robotics, and computing more broadly, typically occurs in a select few laboratories. To combat this challenge, I work to lower the barriers to entry for such research and help expand the robotics and computing communities.

Towards this aim, I develop new algorithmic approaches and software implementations that fundamentally improve the capabilities of low-cost tiny robots, and release all software artifacts, whether targeting tiny or large robots, open-source. Combined, this drastically lowers both the physical and temporal start-up cost to such research agendas. For example, our recent award-winning TinyMPC project resulted in open-source software that provides a step change in the sophistication of planning and control algorithms that can run on common low-cost microcontrollers. As another example, my new NSF CSSI grant is focused on taking our current proof-of-concept GPU software and making it broadly accessible to the community through a series of collaborative research projects. The grant also explicitly includes the development of educational outreach workshops to ensure global adoptability of our resulting software. My hope is that through such projects, in the future, sophisticated robotics solutions can be researched, developed, tested, and deployed, at-scale, by all and for all.

Finally, I also explicitly undertake research to understand global diversity, equity, inclusion, and belonging in robotics and computing more broadly [4, 5]; design and document new interdisciplinary, project-based, open-access courses that lower the barrier to entry of cutting edge topics like robotics and embedded machine learning [1, 3, 6]; and collaboratively promote a sustainable and privacy preserving future for edge computing [7, 8, 9, 10]. I look forward to continuing such lines of research at your college or university.

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